

WHAT IS CLAIMED IS:

1. A closure device for closing an opening in a body cavity, comprising:

an elongate delivery member having a distal end and a proximal end; and

a closure component removably connected to the distal end of the delivery member, the closure component including a collapsible backing movable between a non-collapsed position and a collapsed position, and a plurality of fibrous tissue engaging members disposed on the backing and oriented in a non-engaging orientation when traveling in a distal direction and in an engaging orientation when traveling in a proximal direction, the fibrous tissue engaging members entangling the backing when the backing is in the collapsed position.

2. The closure device of claim 1 wherein the backing is formed in a generally elongate conformation, along a generally longitudinal axis of the backing, in the non-collapsed position.

3. The closure device of claim 2 wherein the backing is collapsed generally along the longitudinal axis thereof when in the collapsed position.

4. The closure device of claim 3 wherein the fibrous tissue engaging members form proximally facing hooks.

5. The closure device of claim 4 wherein the proximally facing hooks are spaced along the backing from a proximal portion thereof to a distal portion thereof when the backing is in the non-collapsed position.

6. The closure device of claim 5 wherein the hooks entangle in the backing located proximal of the hooks as the backing moves from the non-collapsed position to the collapsed position.

7. The closure device of claim 4 wherein the body cavity is defined by generally smooth tissue and has fibrous tissue proximal thereof and wherein at least a subset of the plurality of hooks are oriented to engage the fibrous tissue as the hooks travel in a proximal direction relative to the fibrous tissue.

8. The closure device of claim 7 wherein the closure component is generally conical having a first row of hooks disposed about a proximal end thereof.

9. The closure device of claim 8 wherein the first row of hooks passes along the generally smooth tissue without engaging the generally smooth tissue and

engages the fibrous tissue as the closure component is moved proximally relative thereto.

10. The closure device of claim 4 wherein the closure component is generally conical having a first row of hooks disposed about a proximal end thereof and wherein the first row of hooks includes tissue piercing hooks that pierce tissue as they are moved proximally relative thereto.

11. The closure device of claim 4 wherein the backing comprises a resilient web stretched over a distal support structure on the elongate delivery member.

12. The closure device of claim 4 wherein the backing forms a cone with collapsible rings, spaced from one another along the longitudinal axis thereof when in the non-collapsed position and generally collapsed relative to one another along the longitudinal axis thereof when in the collapsed position.

13. The closure device of claim 1 and further comprising:

an active actuator having a distal engaging end disconnectably connecting the closure component to the delivery member and a proximal end receiving an actuation input

and actuating the distal engaging end to release the closure component in response to the actuation input.

14. The closure device of claim 1 wherein the backing generally forms a web having collapsible support members supporting the web in the non-collapsed position.

15. The closure device of claim 1 and further comprising:

a collapse actuator which, when actuated moves the closure component from the non-collapsed position to the collapsed position.

16. The closure device of claim 15 wherein the collapse actuator comprises:

an elongate member having a distal end disconnectably connected to a distal end of the closure component, the elongate member being configured to move the distal end of the closure component to a more proximal position to collapse the closure component under proximally directed force applied to the elongate member.

17. The closure device of claim 16 and further comprising:

a deformable hook at the distal end of the elongate member.

18. The closure device of claim 17 wherein the elongate member is received within a distal aperture in the closure component and wherein the deformable hook is located distal of the distal aperture when the closure component is in the non-collapsed position.

19. The closure device of claim 18 wherein the deformable hook moves a distal end of the closure component to a more proximal position to collapse the closure component under proximally directed force applied to the elongate member.

20. The closure device of claim 19 wherein the deformable hook deforms to pass through the distal aperture in the closure component after the closure component has moved to the collapsed position under continued application of proximally directed force on the elongate member.

21. The closure device of claim 16 wherein the elongate member comprises a wire.

22. The closure device of claim 21 wherein the wire comprises a frangible connection to the distal end of the closure component.

23. The closure device of claim 21 wherein the wire comprises a mechanically releasable connection to the distal end of the closure component.

24. The closure device of claim 1 wherein the closure component is formed of biocompatible material.

25. The closure device of claim 1 wherein the closure component is formed of bioabsorbable material.

26. A method of closing an opening in a body, comprising:

inserting distally through the opening a closure component having collapsible pile backing with pile engaging hooks and tissue engaging hooks disposed thereon;

withdrawing the closure component proximally relative to the opening such that the tissue engaging hooks engage tissue adjacent the opening; and

collapsing the collapsible pile backing so the pile engaging hooks engage portions of the pile backing.

27. The method of claim 26 wherein inserting comprises:

inserting the closure component with an elongate delivery member, the closure component being disposed at a distal end of the delivery member.

28. The method of claim 27 and further comprising:  
disconnecting the closure component from the distal end of the delivery member.

29. The method of claim 28 wherein disconnecting comprises:  
exerting proximally directed force on the delivery member after collapsing the collapsible pile.

30. The method of claim 26 wherein collapsing comprises:  
moving a distal end of the closure component toward a proximal end thereof.

31. The method of claim 26 wherein the tissue engaging hooks are comprised of tissue piercing hooks that pierce the tissue when the tissue is engaged.

32. The method of claim 26 wherein the opening is in a body cavity defined by media and having adventitia adjacent thereto and wherein withdrawing comprises:  
withdrawing the tissue engaging hooks proximally past the media to engage the adventitia.

33. A closure device for closing an opening in a body cavity, comprising:

an elongate delivery member having a distal end and a proximal end; and

an implantable closure component disconnectably connected to the distal end of the delivery member, the closure component including a longitudinally collapsible backing movable between a non-collapsed position and a collapsed position, and a plurality of fibrous tissue engaging members on the backing and engaging the backing when the backing is in the collapsed position.

34. The closure device of claim 33 wherein the fibrous tissue engaging members are oriented in a non-engaging orientation when traveling in a distal direction and in an engaging orientation when traveling in a proximal direction.

35. The closure device of claim 33 wherein the backing is formed in a generally elongate conformation, along a generally longitudinal axis of the backing, in the non-collapsed position.

36. The closure device of claim 33 wherein the fibrous tissue engaging members form proximally facing hooks.



37. The closure device of claim 36 wherein the proximally facing hooks are spaced along the backing from a proximal portion thereof to a distal portion thereof when the backing is in the non-collapsed position.

38. The closure device of claim 37 wherein the hooks entangle in the backing located proximal of the hooks as the backing moves from the non-collapsed position to the collapsed position.

39. The closure device of claim 38 wherein the body cavity is defined by generally smooth tissue and has fibrous tissue proximal thereof and wherein at least a subset of the plurality of hooks are oriented to engage the fibrous tissue as the hooks travel in a proximal direction relative to the fibrous tissue.